THERMOSTATIC CONTROLLER AND CIRCUIT TESTER

This device is designed for exclusive use and deployment in the "HEATING VENTILATING AND AIR CONDITIONING" (HVAC) industry. This utility device along with its attributes, is the product of years of working and tolerating the shortcomings of current test equipment available to the trade.

This product as illustrated in Figure 1 is designed for the trades needs and demands as envisaged by the inventor, of whom, is a HVAC technician. This device is time saving and space saving, while giving the technician greater flexibility and latitude when working alone.

The device comprises two separate circuits that performs independently of each other. The two circuits are never integrated, except when using the circuit tester to check continuity of the controller circuit, whenever necessary.

The THERMOSTATIC CONTROLLER AND CIRCUIT TESTER is ideal for fieldwork, in the workshop and classroom demonstration. But nowhere does its attributes comes into its own, than in fieldwork. That is when its usefulness is highlighted due to its diverse working environment. Package units located on roofs or on the sides of buildings, air handlers and water cooled heat pumps located in dark closets and sometimes attics, do sometimes pose a challenge to the technician, mainly because of their accessability by ladders only.

This sometimes requires the technician to ascend and descend ladders to test the repairs made, by operating the thermostat, or he can shout down to someone (if available) to operate the thermostat.

With "THERMOSTATIC CONTROLLER AND CIRCUIT TESTER" all he needs to do is switch the thermostat to off and switch off the line voltage disconnect switch located on or nearby the unit, to off. Then proceed to troubleshoot and make repairs. When repairs are completed, the alligator clips are then attached to the low voltage connector block or thermostat wire connections by removing wire nuts and exposing the bare wires. Then go ahead and operate the controller circuit by pressing the switches one to four.

The technician avoids unnecessary trips to the thermostat location, saves time and energy and most of all he is now very independent of extra tools and helping hands.

THE CONTROLLER CIRCUIT AND HOW IT WORKS

Refer to Figure 2. The controller circuit is basically a kind of portable thermostat without the sensor and circuit board. There is no PC board of semiconductor components involved in its circuitry. It consists of four push on/push off switches arranged in parallel and soldered to four color coded wires 30 inches long from each switch with alligator clips soldered to the other ends of each wire.

With reference to Figure 2, switches 1-4 are all in the open position, therefore making the circuit off and inactive. In Figure 4 switches 1 and 2 are engaged in the ON mode. Both switches are now energized. Switch 1 passes low voltage power from the secondary output of the transformer onto Switch 2 which in turn passes the voltage to Relay 1. Relay 1 would then be energized and closed. This allows line voltage to flow via Relay 1 to the load. Switch 2 is connected to the green wire, which in HVAC trade is universally associated with fan or blower. Switches 3 and 4 are still in the open position, but when energized and closed via Switch 1, they perform their roles the same way as Switch 2.

The THERMOSTATIC CONTROLLER AND CIRCUIT TESTER can also be used to determine if a thermostat is defective or if there is a broken wire between the thermostat and the units that comprises the air conditioning system.

To do so, simply switch off breaker or disconnect switch, then dismantle thermostat from wall. Disconnect thermostat wires from their terminals. Now connect the controllers alligator clips to the ends of the exposed wires, RED to RED, YELLOW to YELLOW or BLUE, GREEN to GREEN and WHITE to WHITE. Now go ahead and switch on breaker or disconnect switch. Operate system by means of the controller's push on/push off switches 1-4. The technician then makes his diagnosis based upon the unit's performance and his findings.

THE TEST CIRCUIT AND HOW IT WORKS

In Figure 5 there is an electronic circuit board as part of a variable circuit. This circuit comprises a light source, a buzzer for checking continuity and a tiny printed circuit board that consists of two bias resistors and two neon lamps. This latter circuit is designed for testing AC voltage. The light and buzzer section of this circuit are powered by the two 1.5 VDC batteries = 3 VDC. A DPDT slide switch (on/off) is an integral part of this circuit and is used to switch roles.

Refer to Figure 5. The circuit tester and light source are operated as follows: the two 1.5 VDC batteries = 3 VDC are arranged in series. A 3 VDC pre-focused flashlight bulb along with a momentary switch (SW1) arranged in parallel, is fed by the batteries.

The momentary switch (SW1) was chosen, so as to save battery energy, by not being unintentionally left on for long periods.
This is the built-in flashlight operated by Switch 1. The circuit extends to a DPDT slide switch (SW2).

From switch 1 a 3 VDC buzzer and a 315 MA quick blow fuse (for buzzer protection) are arranged in series and connected to one end of switch 2 at position "A".

When switch 2 is switched to position "A", the circuit is now in the mode for continuity test. The middle tags of switch 2 are connected to two output test lead jacks. As illustrated at the bottom of Figure 5, when the circuit tester via the detachable test leads and probes are brought into contact with a metallic object such as a fuse, the buzzer should emit an audible sound if the fuse is good.

On the other side of switch 2, the switch is now engaged in position "B" as illustrated in Figure 6. This section of the circuit comprised of series and parallel arrangements of two resistors and two neon lamps. This is the voltage testing circuit.

The two bias resistors, arranged in series, serves as a pair of controlling devices, that allows the right voltage to go to the right neon lamp, thus illuminating it. The illustration in Figure 6 shows the test probes inserted in a wall socket of a 120 VAC receptacle.

R2 (33K) is the bias for the 120 VAC neon lamp. The lamp is now glowing.

When the test probes are inserted in a 240 VAC source or outlet, the bias resistor R1 (220K) allows 240 VAC neon lamp to glow.

When not in use, the test circuit should be switched to position "B" which is also the off position for the battery's power. Figure 7 illustrates the actual assembly of the device.